

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

FRKelly
Attn. Boyce, Cono
27 Clyde Road
Ballsbridge
Dublin 4
IRLANDE

RECEIVED

23 NOV 2009

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DATE: / /

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

<p>Date of mailing (day/month/year) 24/11/2009</p>	
<p>Applicant's or agent's file reference P94606PC00</p>	<p>FOR FURTHER ACTION See paragraphs 1 and 4 below</p>
<p>International application No. PCT/EP2009/005809</p>	<p>International filing date (day/month/year) 11/08/2009</p>
<p>Applicant FOTONATION IRELAND LIMITED</p>	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

<p>Name and mailing address of the International Searching Authority</p> <div style="display: flex; align-items: center;"> <div> <p>European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016</p> </div> </div>	<p>Authorized officer</p> <p style="text-align: center;">Dana Schalinatus</p>
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference P94606PC00	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/EP2009/005809	International filing date (day/month/year) 11/08/2009	(Earliest) Priority Date (day/month/year) 14/08/2008
Applicant FOTONATION IRELAND LIMITED		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☐ **Unity of invention is lacking** (see Box No III)

4. With regard to the **title**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 1-4
☐ as suggested by the applicant
☐ as selected by this Authority, because the applicant failed to suggest a figure
☒ as selected by this Authority, because this figure better characterizes the invention
 b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2009/005809

A. CLASSIFICATION OF SUBJECT MATTER

INV. G03B15/05 G03B19/02 H04N5/225

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04N G03B G06K G06T

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 649 238 A (WAKABAYASHI HIROSHI [JP] ET AL) 15 July 1997 (1997-07-15) figures 1,6,7,9 abstract	1-18
A	----- US 5 678 073 A (STEPHENSON III STANLEY WARD [US] ET AL) 14 October 1997 (1997-10-14) figure 1	1-18
A	----- US 5 708 866 A (LEONARD BRUCE ADAMS [US]) 13 January 1998 (1998-01-13) figure 1	1-18
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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *G* document member of the same patent family

Date of the actual completion of the international search

12 November 2009

Date of mailing of the international search report

24/11/2009

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Trimeche, Mejdi

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2009/005809

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>AGRAVAL A ET AL: "Removing photography artifacts using gradient projection and flash-exposure sampling" 31 July 2005 (2005-07-31), ACM TRANSACTIONS ON GRAPHICS, ACM, US, PAGE(S) 828 - 835 , XP002442303 ISSN: 0730-0301 Sections 1, 2, 4.</p> <p>-----</p>	1-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2009/005809

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5649238	A	15-07-1997	NONE	
US 5678073	A	14-10-1997	NONE	
US 5708866	A	13-01-1998	JP 10039379 A	13-02-1998

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2009/005809

International filing date (day/month/year)
11.08.2009

Priority date (day/month/year)
14.08.2008

International Patent Classification (IPC) or both national classification and IPC
INV. G03B15/05 G03B19/02 H04N5/225

Applicant
FOTONATION IRELAND LIMITED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0
Fax: +49 89 2399 - 4465

Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Trimeche, Mejdi

Telephone No. +49 89 2399-4288



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2009/005809

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in electronic form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2009/005809

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-18</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>1-18</u>
	No: Claims	
Industrial applicability (IA)	Yes: Claims	<u>1-18</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Reference is made to the following documents:

- D1: US 5 649 238 A (WAKABAYASHI HIROSHI [JP] ET AL) 15 July 1997 (1997-07-15)
- D2: AGRAVAL A ET AL: "Removing photography artifacts using gradient projection and flash-exposure sampling" 31 July 2005 (2005-07-31) , ACM TRANSACTIONS ON GRAPHICS, ACM, US, PAGE(S) 828 - 835 , XP002442303 ISSN: 0730-0301

Re Item VIII.

- 1 The application does not meet the requirements of Article 6 PCT, because independent claims 1, 2, 17 and 18 are not clear.
- 1.1 The term "flash eye" defect in claims 1 and 2 is not clear. The person skilled in the art refers to the phenomenon as "red eye", as specified in claim 5. Without prejudice to the sought protection, it is understood that "red eye" describes the unnatural pupil colouration due to flash light reflecting from the retina, and may manifest in a range of colour shades between yellow, orange and red depending on retinal structure, pupil size, photography settings and external lighting.
- 1.2 The expression "disposed at different distances" in claims 1, 2, 17 and 18 is unclear because its scope is broader than justified by the description and drawings. As claimed, two flash units (or two lenses) may be placed on different sides of the camera body and still be covered by the claim whereas in the drawings, two flash units (or two lenses) and a single lens (or a single flash unit) are disposed *horizontally* on the same line and on the *same side* of the camera body.
- 1.3 The term "normalizing" in claims 1 and 2 is vague and leaves the reader in doubt as to the meaning of the technical features to which it refers, thereby rendering the definition of the subject-matter of said claims unclear, Article 6 PCT. The person skilled in the art might interpret "normalizing" in several ways, for example exposure normalizing, white balancing between the two reference images, brightness correction, contrast adjustment, shadow correction, displacement correction (in relation to claim 1), stereo rectification (in relation to claim 2), etc. The person skilled in art would also recognize that each of these steps involve elaborate calculations to achieve the desired effect, for instance in D2 (see referenced documents below), in a similar context of carrying out alone the step of luminance normalization, it is shown that the ratio of brightness in the flash and the ambient image represents the combined effects of depth and surface orientation, so quite an elaborate step if precise results are sought. Hence the step of "normalizing" cannot be

claimed in such generic terms because it may be sub-divided into several individual steps that are not disclosed in the description. Additionally, the choice of the composition and the details of the individual steps for "normalizing" a pair of images depends heavily on whether the hardware arrangement of the lenses and flash units is provided according to claim 1 or according to claim 2. Therefore, the formulation of claim 7 as depending alternatively on claim 1 or claim 2 is not appropriate since the required alignment step is obviously different for both arrangements. In light of the description, it appears to be essential that the eyes are aligned as in claim 8, otherwise the problem of red eye correction can not be solved.

- 1.4 The choice and numbering of the reference signs is confusing since for example Figure 1A and camera 1A are different things. The reference signs 2A and 2B on figure 5 are referred to in the description as 2a and 2b. Also in Figure 6, 14A and 14B are referred to in the description as 14a and 14b. The description contains minor errors for example on page 5, lines (7, 9, 11) and page 6 (line 2).

Re Item V.

- 1 In the following, the claims have been interpreted in light of the clarity remarks raised in Item VIII. In particular, a horizontal arrangement of the lenses and light sources is assumed for the purpose of red-eye reduction, and the "normalizing" step in claims 1 and 2 comprises aligning the detected position of the eyes in the first and second reference images.
- 2 The known techniques for dealing with red eye defect can be summarized as follows:
- Take pictures without flash, i.e., increase the ambient lighting, open the lens aperture, reduce shutter speed.
 - Use bounce flash in which the flash head is aimed at a nearby surface such as a ceiling or wall or at a specialist photographic reflector to change the direction of the flash and ensure that only diffused flash light enters the eye.
 - Place the flash away from the camera's optical axis to ensure that the light from the flash hits the eye at an oblique angle.
 - Use the strobe pre-flash which consists in a series of short, low - power flashes, or a continuous piercing bright light to trigger the iris to contract before capturing the actual image.

- Apply post-processing to correct for red-eyes, this option is available in some camera models and in most image editing tools, however the fully automatic modes are usually not reliable, so semi automatic algorithms are usually implemented, where the user is required pinpoint the eye positions in order to perform red eye reduction.
- Combining flash/no-flash images taken consecutively using a camera with one lens and one flash unit; this is a newer approach that promises to achieve improved HDR and red eye reduction at the same time.

3 Document D1, which is considered to represent the most relevant state of the art, discloses:

- A camera with two built -in flash light emitting units, the first is located directly above the lens, and the second is located at an upper corner of the camera body. The camera has autofocus system which determines distance to the subject, and the camera logic decides on which flash unit to activate in order to compromise between shading and red eye reduction.*

D1 utilises the underlying principle that red eye phenomenon arises when the angle between the light emitting source and the optical axis of the lens is 2 degrees or less, therefore a second flash unit that is placed further away from the lens is used to create a larger angle with the lens. Note also that it is generally known that the image with the smaller angle to the optical axis exhibits less shadows.

The subject - matter of independent claim 1 differs from D1 in that:

- Two reference images are acquired consecutively using the first flash light and the second flash light and further aligned, subtracted from each other in order to determine and correct for red eye defect in a resulting main image.*

3.1 The subject - matter of claim 1, when reformulated to overcome the clarity objection raised in **Item VIII**, is therefore novel (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as:

- How to determine and correct for red-eye defect using a camera that has two flash units disposed at different distances from the camera lens and thereby forming different angles to the optical axis.*

3.2 The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

- Taking two consecutive images using the two flash units, aligning these and analysing the difference to detect and correct for the red eye defect is inventive and additionally involves processing steps which are not obvious to the person skilled in the art.*

- 3.3 Accordingly, it is considered that combining and processing two consecutive images of a subject illuminated with light sources (flash strobes) forming different angles with the camera lens *for the purpose of correcting red eye defect* appears to be both new and inventive.
- 4 The subject matter of independent claim 2, can be considered as an alternative solution for red eye correction involving two lenses and one light source instead of two light sources and one lens. Parallel reasoning as above is valid, thereby also rendering the subject matter of claim 2 when reformulated to overcome the clarity objection raised in **Item VIII** is novel and inventive.
- 5 Independent claims 16-18 are closely related to claims 1 and 2 and therefore when reformulated to overcome the clarity objection raised in **Item VIII** also meet the requirements of PCT with respect to novelty and inventive step.
- 6 The dependent claims 3-15 when reformulated to overcome the clarity objection raised in **Item VIII** as such also meet the requirements of the PCT with respect to novelty and inventive step.